

The reed valve arms are made of stainless steel or similar inert metal, and the shut-off valve face 17, 17' contacts on the arms are preferably of plastic material such as nylon, or fluoropolymer or the metal of the arms would be sufficient to hold the vent closed against a pressure of 1—3 pounds per square inch.

Further description includes an outlet aperture 20 adjacent to a pillar 19, in fuel cap body 5, and an aperture cover 4, having an umbrella or parabola shape mounted on the pillar 19, and the aperture cover concave side 23 edge landed on the surface 27 around the pillar 19 and the outlet aperture 20 and the inlet aperture 25 adjacent to a second pillar 18 in the fuel cap body 5, and a second aperture cover 6 having an umbrella or parabola shape FIGS. 22 and 23, mounted on the second pillar 18 and the concave side edge 24, of the aperture cover landed on surface around the second pillar 18 and the inlet aperture 25, on the underside flat top 27 of fuel cap body 5.

The fluoropolymer thermoplastic material moldings of aperture covers should have a preferred Shore A hardness of 45 to 65, with a preferable range of 50 to 60 hardness.

The word "landed" means the edges 24 and 28 of the outlet and inlet aperture covers 4 and 6 are in contact with the respective surface around the pillars 18, 19 and the apertures 20 and 25, and the attachment of the outlet/inlet umbrella covers 4 and 6 to the pillars 19 and 18 is tight to prevent any vent leakage between the pillars and the umbrella covers.

As an alternate, to obviate springs in a vehicle fuel cap outlet and inlet vent apparatus a first outlet aperture 20 vent in a fuel cap body 5 and a metal reed 13 attached on one end 6 and adjacent to outlet aperture 20 vent the end 26 of the reed 13 opposite to attached end 16 extending over aperture 20 to close the outlet aperture 20, end of the metal reed 13 opposite to the attached end in shut off contact with the outlet aperture vent 20, and, an inlet aperture 25 in the fuel cap body 5, a second metal reed 13' attached on one end 16' and adjacent to aperture 25 for inlet vent, the end 26' of the second metal reed 13' opposite to attached end 16', extending to cover inlet aperture vent 25, the end 26' of the second metal reed opposite to the attached end 16 in shut off contact with the inlet aperture 25.

In all of the above discussion and disclosure, the umbrella parabola covers 4 and 6, and reed valves 13 and 13' are actuated to vent either in or out by a pressure difference between the fuel tank and the atmospheric pressure.

What is claimed is:

1. Vehicle fuel cap outlet and inlet vent apparatus wherein the improvement comprises;

- a an outlet aperture adjacent to a pillar in fuel cap body,
- b umbrella or parabola shaped aperture cover having a mounting aperture to receive said pillar

c an aperture cover concave side edge landed on surface around said pillar and said outlet aperture, and,  
d an inlet aperture adjacent to a second pillar in said fuel cap body,

e a second aperture cover having an umbrella or parabola shape having a mounting aperture to receive said second pillar,

f and concave side edge of said aperture cover, landed on surface around said second pillar and said inlet aperture

2. Vehicle fuel cap outlet and inlet venting apparatus of claim 1 further comprising;

a said outlet aperture cover and said inlet aperture cover comprised of thermoplastic material having a Shore A scale hardness of 45 to 65.

3. Vehicle fuel cap outlet and inlet vent apparatus of claim 2 further comprising;

a said outlet aperture cover and said inlet aperture cover comprised of fluoropolymer thermoplastic material having a Shore A scale hardness of 45 to 65.

4. Vehicle fuel cap outlet and inlet vent apparatus of claim 2, further comprising;

a said outlet aperture cover and said inlet aperture cover, having an umbrella or parabolic shape consisting of fluoropolymer thermoplastic molded material and said molded material having a Shore A scale hardness of 50 to 60.

5. Vehicle fuel cap outlet and inlet vent apparatus wherein the improvement comprises;

a a first outlet aperture vent in a fuel cap body,

b a first metal reed attached on one end and adjacent to said outlet aperture vent

c the end of said reed opposite to attached end extending to close said outlet aperture,

d end of said metal reed opposite to said attached end in shut off contact with said outlet aperture vent and,

e an inlet aperture in said fuel cap body,

f a second metal reed attached on one end and adjacent to aperture for inlet vent,

g the end of said second metal reed opposite to attached end, extending to cover said inlet aperture, and

h end of second metal reed opposite to said attached end in shut off contact with said inlet aperture, and

i a coating of plastic elastomer on said shut off ends of said reed valves.

6. Vehicle fuel cap outlet and inlet vent apparatus of claim 5, further comprising;

a a coating of fluoropolymer thermoplastic on said shut off ends of said reed valves.

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